

The invention claimed is:

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A5*
1. A method regulating traffic in a communications network comprising the steps of:
    - 1 aggregating one or more component traffic flows into a component traffic stream;
    - 2 aggregating one or more component traffic streams into an aggregate stream;
    - 3 carrying the aggregate stream in a single, FIFO queue; and
    - 4 generating selective backpressure on selected ones of the component traffic streams such that selected ones of the component streams are desirably regulated.
  2. The method according to claim 1 wherein said aggregation of the one or more traffic flows is performed according to the destination of the traffic flows and the similarity of the Quality of Service requirements of the traffic flows.
  3. The method according to claim 3 wherein said aggregation of the one or more component traffic streams into an aggregate stream is performed according to the destination of the component traffic stream.
  4. The method according to claim 3 wherein said aggregation is performed according to the absence of delay guarantees.
  5. The method according to claim 4 wherein said aggregate stream is carried in a single, FIFO queue.
  6. The method according to claim 5 wherein said generating selective backpressure step comprises the steps of:
    - 1 maintaining an aggregate queue occupancy counter;
    - 2 maintaining a credit counter for each component traffic stream; and
    - 3 asserting selective backpressure for a specific one of the component traffic streams when the corresponding credit counter reaches a predetermined threshold.
  7. The method according to claim 6 further comprising the steps of:

2 initializing the credit counter to a maximum value;  
3 decrementing the counter when an item of specific type arrives in the aggregate  
4 queue;  
5 incrementing the counter when the queue is given service granted to the specific type  
6 of traffic stream without regard to the type of data item which departs the single  
7 FIFO queue;  
8 truncating the counter at a specific maximum level; and  
9 resetting the counter to a maximum value when the occupancy of the aggregate queue  
10 falls to zero.

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1000*
8. The method according to claim 6 wherein said backpressure asserting step is performed when the credit counter reaches a value of zero.
  9. The method according to claim 4 wherein the two of said component traffic streams are the Guaranteed Bandwidth Traffic Stream and the Best Effort Traffic Stream, and wherein each data item arrival and departure event can be associated with either guaranteed or excess bandwidth service provided by a corresponding scheduler.
  10. The method according to claim 9, wherein the generating selective backpressure step further comprises the steps of:
    - 3 maintaining an aggregate queue occupancy counter;
    - 4 maintaining a Best Effort credit counter;
    - 5 asserting a first type of backpressure; and
    - 6 asserting a second type of backpressure.
  11. The method according to claim 10 wherein said first type of backpressure is applied towards both the Guaranteed Bandwidth Traffic Stream and the Best Effort Traffic Stream and wherein said second type of backpressure applies toward the Best Effort Traffic Stream.

12. The method according to claim 11 wherein said step of maintaining a Best Effort credit counter further comprises the steps of:

initializing the counter to a maximum value;

incrementing the counter when an excess bandwidth service is provided to said aggregate queue;

decrementing the counter when a data item arrival is associated with excess bandwidth service; and

resetting the counter to its maximum value each time the occupancy of said aggregate queue reaches a value of zero.

1    13. The method according to claim 12 wherein said incrementing step is not performed if  
2       the first type of backpressure is asserted.

1 14. The method according to claim 12, wherein said decrementing step is not performed if  
2 the arriving data item belongs to the Guaranteed Bandwidth Traffic Stream.

15. The method according to claim 10 wherein said step of asserting a first type of backpressure occurs whenever the aggregate queue occupancy counter exceeds a predefined threshold.

1 16. The method according to claim 10, wherein said step of asserting a second type of  
2 backpressure occurs whenever the Best Effort credit counter reaches a value of zero.